FOLDED-ELEMENT COLLINEAR ANTENNA FOR 2 METRES

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The "Slim Jim" is a most popular 2 metre antenna for stations within reasonable distance from a repeater and where omni-directional characteristics are required. This was featured in a previous article by the author on the construction and operation of an updated "Slim Jim".

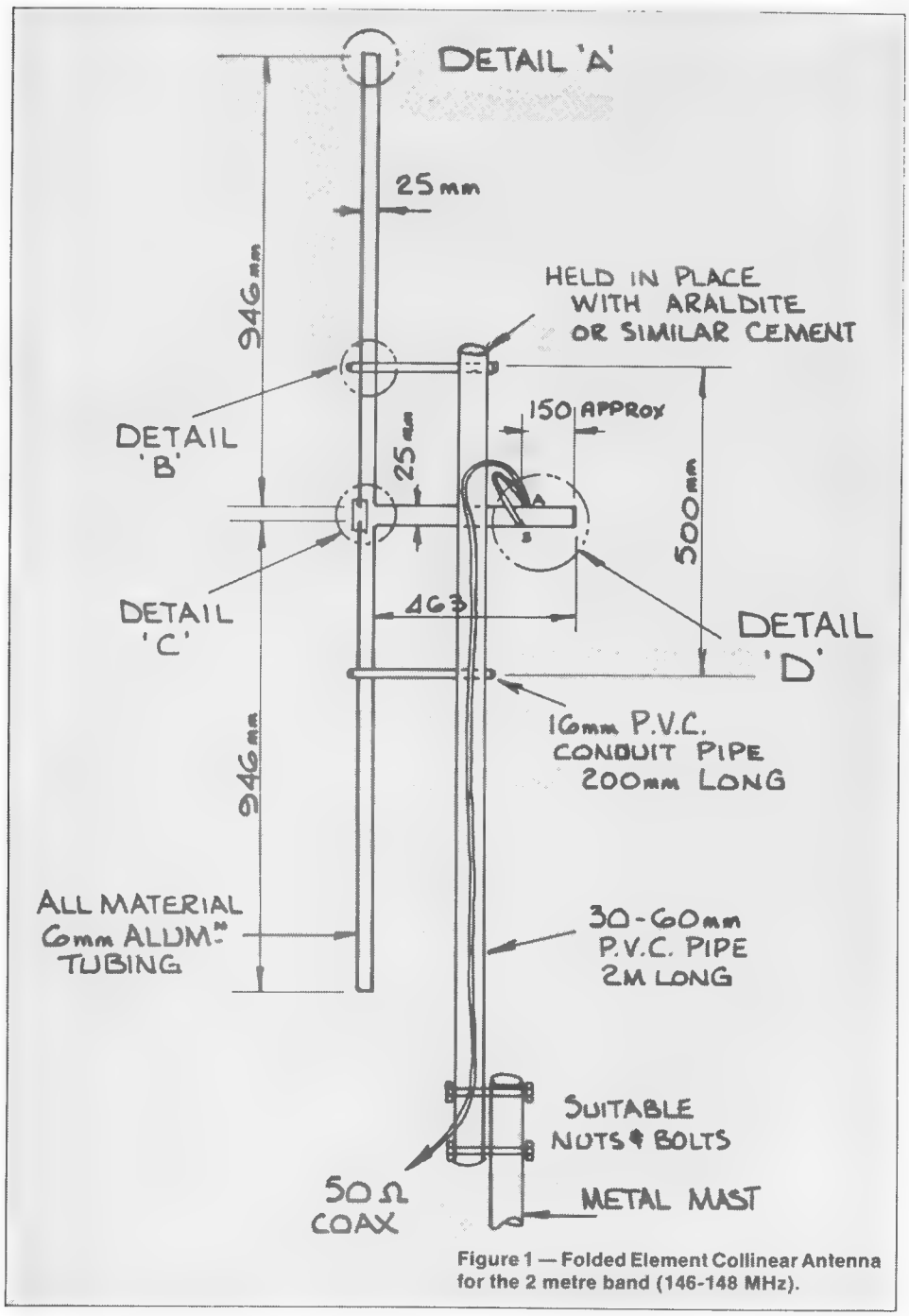
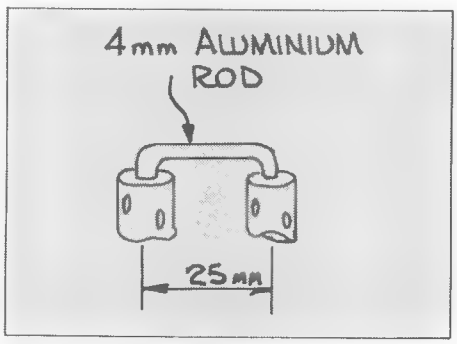


Figure 1 — Folded Element Collinear Antenna for the 2 metre band (146-148 MHz).

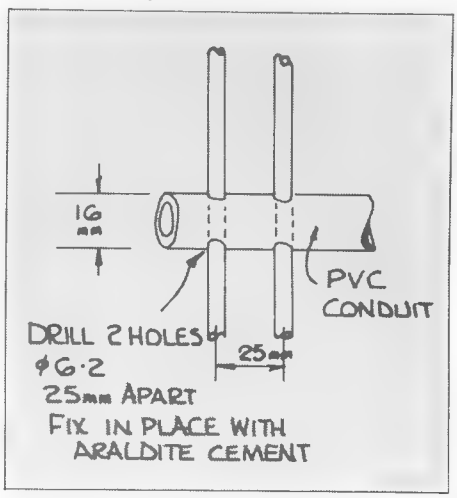
In an attempt to derive more antenna gain and still retain omni-directional properties, the old, still popular "two half waves in phase" antenna was revalued. This type of antenna is featured in many text books as the "Plumbers Delight" because it can be constructed with copper pipe using plumbing elbows etc. The antenna is claimed to have a slight gain over a "J Pole" or "Slim Jim", however, on test it has been found that whilst there is a "gain" there is also a problem in achieving a satisfactory impedence match resulting in a higher than desirable SWR.

DESIGN

The antenna to be described, was originally developed by F C Judd G2BCX for using a repeater in UK and is a variation of the original "two half waves in phase". This antenna uses two folded dipole elements fed in phase through a quarter wave stub and a co-axial cable "balun" matching system. The result is an antenna that is balanced and symmetrical, and exhibiting a very good impedence match resulting in a low SWR over the 2 m band and providing worthwhile gain.



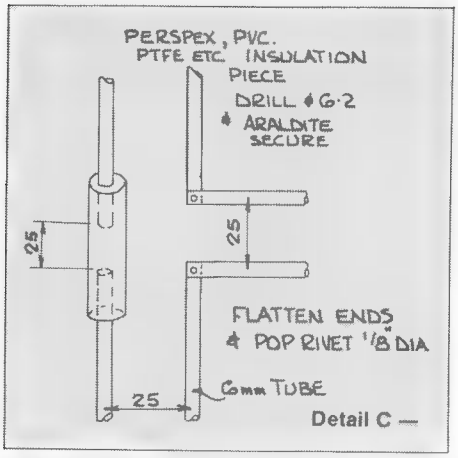
Detail A — Drill out tubes and press in end piece. Centre punch to locate and hold.

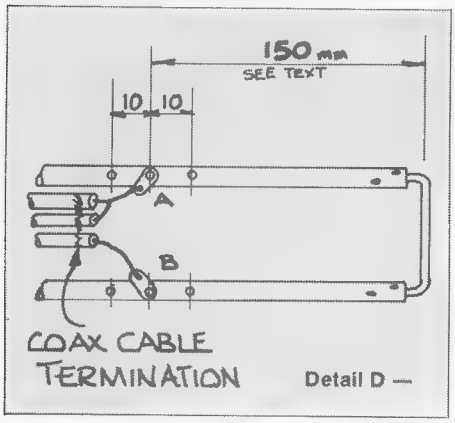


Detail B — Fix in place with Araldite.

CONSTRUCTION

The supporting frame for the antenna is made from electricians PVC conduit, a most suitable material for antenna construction and preferable to wood. The elements are made from (¼") 6 mm aluminium tubing. This is readily available and reasonably cheap to purchase.





The general construction is reasonably straight forward and details are shown in the sketches. The end sections of the dipoles and the matching stub are made from 4 mm aluminium rod.

Other metals, brass etc could be used, however, there is an electrolysis problem with dissimilar metals resulting in corrosion and consequent high resistance connection. All mounting of elements is achieved by drilling a neat clearance hole and securing with "Araldite" or other epoxy type cement.

Care must be taken when drilling 16 mm holes through the PVC support mast. A smaller hole can be drilled first and then enlarged with a round file or reamer.

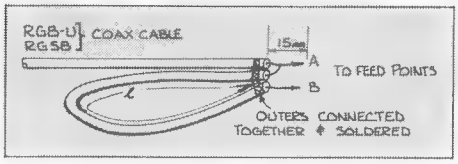
COAXIAL CABLE "BALUN"

The balun should be made from a section of the same cable that is used to feed the antenna. A cable with low loss is preferable and RG8 or equivalent is suitable. If the overall length of cable is not excessive, say, less than fifteen metres, then RG-58-AU "foam" dielectric is quite suitable. This cable combines low loss, thin diameter, and easy handling. The ½ wave section must be carefully cut to the correct length depending on the cable dielectric. If standard solid dielectric cable is used, the velocity factor is 0.66 resulting in a length of 673 mm measured from outer covering ends. (see sketch). If "foam" cable is used the velocity factor is 0.75 giving an overall length of 765 mm.

The section should be looped and taped as shown and carefully terminated. The termination can be water proofed by PVC tape or some sealing compound. If water enters the cable it will be damaged and characteristics altered considerably. The "balun" and cable ends are soldered to lugs and screwed with self tapping screws to the matching section.

TESTING AND ADJUSTMENT

After deciding on the final location of the antenna and the length of the feed cable, final connection should be made as shown in Detail D. The antenna with full length cable connected should be lifted as



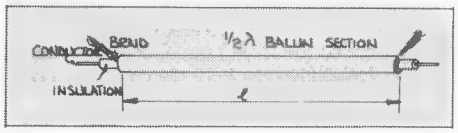
4:1 Balun ½ wave matching (see text)

l = ½ wave. If RG8 or RG58 standard polythene co-axial cable is used, velocity factor = 0.66.

l = 673 mm

If RG8-AU or RG58-AU foam insulated cable is used, the velocity factor = 0.75. l = 765 mm.

½ λ = 150 x .75
147 MHz = 765 mm
= 150 x 0.66
147 MHz = 673 mm



high as possible in the clear and the SWR checked. If all dimensions are correct, and construction details followed, an SWR figure less than 1.5 will result. An improvement can be made by moving the tapping point ± 10 mm from the point shown.

The author has obtained SWR results better than 1.2 over the band with the dimensions shown.

When testing is completed, the cable can be taped or clipped to the support mast and the antenna placed in its final position.

The SWR figure will not change significantly and the antenna will give good results over the entire 2 m band.

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TV LINE OSCILLATOR INTERFERENCE

The problem of TV receiver line oscillator interference on amateur bands is being examined in the WIA EMC and Standards areas.

Federal Executive is seeking information from Divisions which may assist in the preparation of a submission to the Standards Association of Australia proposing improvement in the relevant performance specifications for television receivers. A similar but more general request for information on the problem appeared in the National EMC Advisory Service feature in last month's AR (Page 66).

Duplication of information submitted in response to these requests is unnecessary, since the EMC Service and FE will collate all reports received from both sources.

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RSGB HF CONTESTS

The custom whereby each HF Contest organised by the RSGB has had a different adjudicator each year and therefore a different address for logs to be sent to has caused many problems for entrants from outside the UK who do not necessarily have the information needed. In future the procedure will be much simpler as entries for ALL RSGB HF CONTESTS from outside the United Kingdom may be sent to:—

PO Box 73,
Lichfield,
Staffs, WS13 6UJ,
England.

Please write the name of the contest being entered on the top left-corner of the envelope.

from Region 1 News — Oct '84

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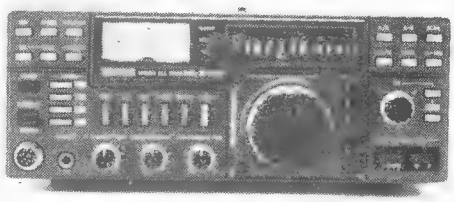
THE WORLD CLASS 2 METRE BASE



Do you remember the IC-211? The boys at ICOM do. You see, it set the pace for 2 metre base station performance many years ago. Optically chopped tuning, processor control, digital PLL, and many features at that time unheard of. In 1984 ICOM are still setting the same high standards for 2 metre base station performance. Dual VFO's, multi mode, 10 Hz PLL tuning are a few of the basic features. This world class radio is supported by a large range of options, many can be seen at your local ICOM dealer.

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